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METAN Green Health & Environmental Engineering & Consultancy Services

END OF LIFE TIRES RECYCLING by PYROLYSIS PROJECT PROPOSAL

Thank you very much for your kind interest in our “SCRAP TIRE RECYCLING “ project proposal.

Metan Green Health & Environmental Engineering & Consultancy Co. Ltd. has been the pioneer in the Turkish market since the establishment of the company in 1998 particularly in healthcare waste management and treatment technologies field as a consulting and engineering company.

The activities of Metan have started as early as 1999 with the consultancy services to her clients mainly from municipalities and continued with becoming one of the major technology providers from Europe and America

After gaining very wide experience, Metan has started designing and manufacturing of medical waste sterilizers in healthcare waste management field in Turkey and is the pioneer of this sector not only as machinery provider but also as plant operator.

Currently Metan is the authorized marketing and exporting company of several local waste treatment equipment manufacturers in Turkey as sterilizers, incinerators, scrap plastic recycling equipment, oil refining machinery, bio-diesel production equipment, containers and wash units, security equipment, and is acting not only equipment and machinery supplier but also as an EPC contractor .

Further Metan has been consulting some companies from many countries as Egypt, Algeria, Bangladesh, Jordan, etc. and offering complete solutions for waste management problems.

Metan is the authorized agent of some selected and reputed foreign manufacturers in scrap tire recycling equipment line and is proudly offering one of the best company's line .

The scrap tire recycling project is prepared at turn-key basis and hopefully for 2 x 15 t/day capacity and can be expanded by adding another units of 15 t/day.

We hope the proposal will be meeting your requirements and receiving your careful consideration.

Yours sincerely



Dr. Cemal Kaldırımci,
Managing Director, Owner
Metan Green Health & Environmental Engineering & Consultancy Services

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A) TECHNICAL OFFER FOR END OF LIFE TIRES ; PYROLYSIS PROJECT

EQUIPMENT AND TECHNICAL SELECTIONS

PROBLEM, GENERATION of ELT (end of life tire)

End of life tires (ELT) are generated every day in a big quantity and naturally causing a gradually growing environmental problem.

It is reported that in Nigeria, there are already 20.000.000 tons of ELT spread around somewhere and also it is anticipated every year another 300.000-400.000 tons are added to the stockpile.

So, ELT tires recycling have two meaning:

- 1- To prevent environment from such a big pollution problem
- 2- To get profit of recycled material in an environmental friendly way

Not all tyres are ready for treatment



SOLUTION

PROCESS, TECHNOLOGY AND SUPPLIER SELECTION

Simply, the ELT recycling process is as chemically called, a PYROLYSIS process. The principles of pyrolysis are very common which is applied to plastics, rubbers and the similar chemical products.

The entire process is schematically illustrated below and underneath is shown the recovered products and average quantities and ratios.

Further, the usages of recovered products are shown in the Table.

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Outcome

12-15% Steel Wire

45-52% Diesel Oil *crude oil, after distillation gasoline and/or diesel oil*

30% Carbon Black




Nb.	By-products	%	Usage
1	Crude oil	45%	1 can be sold directly. 2 could make diesel and gasoline with the use of distillation line 3 can be used as fuel.
2	Carbon black	30%	1 can be sold directly. 2 should make fine carbon by use carbon black refining machine 3 can make pellet by use carbon make pellet machine.
3	Steel wire	15%	1 can be sold directly. 2 can make steel bloom by use hydraulic press-packing
4	Oil gas	10%	1 can be used as fuel in factory by use of gas-burn system (should be included in pyrolysis line) 2 extra gas also be storage as fuel for other heating





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Though there are many of pyrolysis equipment manufacturers and suppliers in the market, it is really hard to find the best technology, most reliable and secure one and proven equipment amongst all of them.

As far as the pyrolysis chemistry is concerned, it is theoretically and practically very easy to get oil and carbon residues if the tires are heated in a closed tank at pyrolysis temperature. But as in the plant, there are highly flammable materials as carbon black and oil, it is very likely that fires occur and burns and the entire plant may become an ash in 10 minutes time.

So, the most important criteria in selecting the technology is the security measures taken against fire possibility. There are numerous numbers of suppliers and manufacturers can do such simple pyrolysis tanks and to get oil and carbon black as product.

But the key factors are the reliability, certification, automation, security and durability.

With respect to the automation in the process, basically, there are three kinds of pyrolysis systems in the market:

- 1- Batch systems
- 2- Semi-continuous systems
- 3- Fully continuous systems

As a statistical information, suppose the number of the batch system manufacturers is 100 in the world, this quantity reduces to 6 to 7 for semi-continuous and 2-3 for fully continuous systems. Naturally the owners of the fully-continuous system manufacturers represent the highest quality and most reliable security.

On the other hand, there is another important parameter to be careful in selecting the correct manufacturer, in the market there are so many traders marketing the products of fewer amounts of manufacturers. So the concept "who is who" is to be clarified carefully.

OUR SELECTION

So, we have selected the most appropriate ones after a very long search, long discussions and visits to the reference plants.

FINALLY WE ARE PROPOSING THE MOST SECURE, PROVEN, FULLY CONTINUOUS 15 T PER DAY WASTE TIRE PYROLYSIS PROCESS FROM A LEADING AND MOST REPUTED CHINESE MANUFACTURER AND PATENT HOLDER.

DETAILED PROCESS DESCRIPTION FOR 15T/day WASTE TIRE PYROLYSIS SYSTEM

The fully continuous horizontal type pyrolysis system applies automatic feeding and discharging process, the raw material is pyrolysed during the moving inside the reactor, which is of high automation, big capacity, and highly safety. Compared with other systems, the advantage of our system is as follow



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WHY OUR PYROLYSIS SYSTEM IS FROM THE BEST PYROLYSIS SUPPLIER

- ✓ Best material 16MnR,20G and GB3087 used for vessel manufacture and every material will be checked in the in-house laboratory , including chemical and physical checking.



- ✓ Designing is co-built by chemical engineers and mechanical engineers over 38 persons due to long history of making over 31 years industrial boiler and pressure vessels
- ✓ Manufacturing is done following the pressure vessel & boiler manufacture standard , Boiler Manufacture Approval License , ISO and CE are hold.
- ✓ Testing method is X-ray , ultra-sound, and water tested by licensed welders



licensed

TESTS AND CERTIFICATES

The manufacturer is holding many quality certificates for the company and products as CE, ISO and the produced system will be factory as well as **SGS and BV** tested and have reference plants working at commercial scales.

ADVANTAGES OVER THE OTHER SUPPLIERS





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Items	Other system	Our system	Advantage
Heating	Direct heating, fuels burnt directly under the reactor	Hot air heating, waste gas recyclable	Safe, environment friendly and increase the working life of the reactor
Reactor	Fixed	Rotating	Higher heating efficiency and fully pyrolysed.
Catalyst	Catalyst and catalytic chamber needed	Not required	Cost saving for customers
Innovative designs	No	1. Syn gas generated from the system fully burnt by the heating system. 2. equip with waste water and exhaust heat treatment system to control the pollution problem	Cost saving for customers and make the system totally environment protection.
Nitrogen gas	No	Nitrogen generator is added	To remove all flammable gases from the reactor system to prevent burning and also producing less water containing fuel with better specifications
Emission	Waste gas, bad smell	Completely air tight system, no harmful gas or bad smell	Environment protection

MAIN SAFETY AND SECURITY FEATURES

The most important feature in the waste tire pyrolysis plants is safety and security measures against fire. So, the key factor is how safe the plant is.

✓ System is including the following safety concerning aspects

1. Our equipments are based on latest pyrolysis technology of hot air heating system. In which we don't burn fire under the reactor. We have separate heating furnace in which we heat the air which is circulated and used for heating the reactor. It's fully safe technology. We can switch off startup burning heat at anytime during the process which can prevent us from any accident.



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2- We have closed screw type feeding and discharge system, at both the feeding the discharging part there are two pneumatic gate valves(flap valve) which are control by the compressed air, with this system there is no chances for oxygen going into the system. So there will be no explosion and fire problems.

3- We have alarm system which will be automatically on when heating temperature going higher or lower. Then the burning system will adjust quickly to avoid any accident.

5-- There is negative pressure in our system, due to this reason we equip with safety valve, when the inner pressure increase suddenly, the safety valve will automatically switch on to keep the balance of the pressure. Also nitrogen generator is used to remove oxygen from the burning system and also produce less water content fuel.

7—for the periodically maintenance, if the oil pipe or any devices in the system have leakages and when the extra welding is needed, our system have one steam connection arrangement , we will use steam to push all the oil residue in the system out in order to guarantee during the maintenance , no fire will be generated at all.

8—for the daily operation of the reactor, our system injects steam into the reactor for several purpose, 1st, we need steam to push them out of the vessel , oil/gas with steam will have better liquidity so that safety is being guaranteed at same time. 2nd, the steam injection into the reactor can prevent any emergency suddenly temperature increasing or any invisible danger in the reactor , before we found the real reason why the temperature or pressure increase, we can in advance immediately use redundant steam input to low down the reactor inside temperatures.3rd. we need steam to clean the pipes during periodical maintenance

PROCESS DESCRIPTION

FULLY CONTINUOUS WASTE TIRE (ELT) PYROLYSIS PROCESS, CAPACITY: UNITS of 15 MT/DAY

1) PRE-TREATMENT LINE

For separating the textile material and steel from the tires and also having a finer and homogeneous input as well as introducing more amount of tire material into the proceeding pyrolysis tank, some pre-treatment equipment is needed.

Depending on the customer's requirements and process parameters, type, kind and qty. of the pre-treatment equipment are to be selected properly.

Waste Tyre recycle line/rubber powder production line
Professional Serier(3000---4500+ton/year)

Steel Tyre
Nylon Tyre

Ring cutter
800mm-1300mm

Steel separator

Ring of steel
Tyre section

Strips of rubber

Rim cutter

Strips cutter

Rubber block

magnetic screening

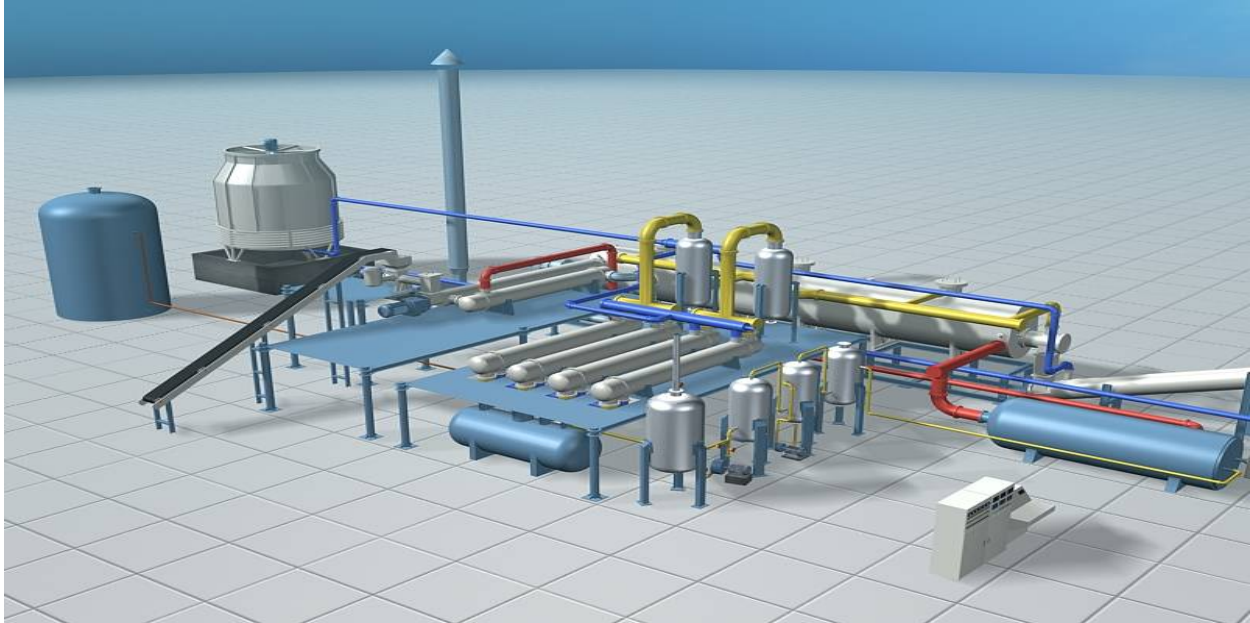
Nylon separator

Rubber powder
Nylon

XKP400/450/560 Type tyre shredder

Fully Continuous Pyrolysis System adopted automatic feeding, automatic discharging, aging of the materials in the reactor, screw driving from the low temperature area to high temperature area and pyrolysis, fully automatic, big capacity, high safety. loved many shortcoming of the fixed bed type and other types pyrolysis equipments (quantity production, low capacity, long cycle, big consumption, heavy physical labor, bad working environment. In the meanwhile, solved the rotary kiln's problem, many sealed point, potential safety and air pollution because of it is easy leakage of oil-outlet and hole of material discharging. Fully Automatic Continuous Pyrolysis System adopted original inner screw propeller, not only ensure the materials heating uniformly, pyrolysis fully, but also ensure the pyrolysis gas and carbon black powder separated fully, incomparable advantage with the rotary kiln pyrolysis machine which the pyrolysis gas mixed with carbon and no separated space, easy to bring vast carbon black powder and block the tubes, equipment and pollute the quality of oil.

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Techniques Flow

1. The cut waste tire pieces are fed into feeding machine and preheated then transported into the reactor. Materials are driven forward in the reactor and pyrolysed. The gas passes through the evaporation pipe on top of the reactor and enters the gas liquid separator. The broken down carbon black and steel wires are discharged by the auto discharging machine into the carbon black conveyor, and the steel wires are separated from the carbon black with the magnetic selector. The carbon black will be given to the carbon black processing machine.
2. The condensed fuel oil comes into relay tank. When oil level of relay tank up to the fixed height, is pumped into the storage tank.
3. The waste gas was discharged from the top of relay tank into waste gas buffer tank, inhaled by the vacuum pump into air liquid separator, where the waste gas is separated from liquid and goes into water sealed tank. From the water sealed tank, waste gas enters the hot air furnace for burning.
4. Cooling water is sucked by the pump from water recycling pool and sent to the condenser tubes. Water travels in the tube from bottom to top and returns to recycling water pool.
5. Steam is generated by the boiler and is passed to the pyrolysis kettle feeding steam inlet, discharging steam inlet and kettle internal inlet, being over heated by the kettle and finally enter the kettle.
6. Fuel oil is dehydrated in the storage tank, sucked by the pump, passing the filter and goes into the fuel oil tank. The oil is supplied to the steam boiler and hot air furnace.

It is very important that the oil generated is with minimum water content and good quality because of the use of nitrogen generator and nitrogen atmosphere in the feeding and burning line.



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AUTO FEEDING



FULLY CONTINUOUS HEATING, INDIRECT



AUTO DISCHARGING

FULLY CONTINUOUS

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SEPERATOR AND CONDENSER

A- PRODUCTS GENERATED:

Product Yield

Fuel oil : 40%

Wire : 15%

Thick Carbon Black : 35%

Non-condensable gas : 8%

Loss : 2%

CARBON BLACK:

Further, carbon black and steel are discharged automatically and each phase are separated by magnetic force.

Optional 1 : The carbon black recovered is sent to carbon black mill for further granulation and packed in 500-1000 mesh size for better use.



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Needs for and Description of carbon black milling:

After pyrolysis, we can get metal parts, heavy crude oil, gas and carbon black. Metal and gas can be recycled. Crude oil can be distilled into fuel oil. Carbon black can be further processed into different sizes, and broadly used in rubber and painting industry. The specific usages are as followed:

1. 50~200mesh, can be used as fuel in the heating system.
2. 200~300mesh, can be pelleted as ball, used as air deodorant, waste water processing, etc.
3. 200~800mesh, can be used in Rubber industry, such as cable, rubber products (like mud cushion).....it can improve rubber quality, enhance abrasive resistance and hardness. (Popular)
4. 800~1500mesh, high grade carbon, used as N330, N600, can directly sell in the market as active agent. (Popular and high value)
5. 1000~2000mesh, higher grade, used in painting industry, in our daily life, the pen ink, print ink, used such powder as raw material. High value
6. 3000~4000mesh, highest grade, used in tyre making as the raw material. Purity should be about 99.99%.

CRUDE OIL:

The recovered oil can be used as crude oil, heating material but also is distilled to generate diesel like fuel oil quality oil.

Option 2 : We are optionally proposing crude oil distillation system in 10 t/day capacity.

SUMMARY AND MAIN COMPONENTS OF THE PROPOSED SYSTEM

I) PROCESS MACHINERY

1- PRE-TREATMENT:

Steel wire pulling equipment
Shredder
Automatic feeding

2- PYROLYSIS SYSTEM

Automatic discharge of steel and carbon
Automatic separation of steel and carbon black

3- PURIFICATIONS

Carbon black milling and packaging
(Option 1; please see the details and breakdown in Appendix 2.)

Crude oil distillation
(Option 2 , Please see the details and breakdown in Appendix 3.)



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II) EXTERNAL LOGISTICS - TRANSPORT OF ELT TIRES

Used tires are to be transported in suitable trucks to the ELT treatment plant by the authorized service company's workers.

Or the pyrolysis plant can be installed in the compound of the largest ELT stocker.

III) PYROLYSIS PLANT BUILDING – HOUSING (unit of 15 t/day)

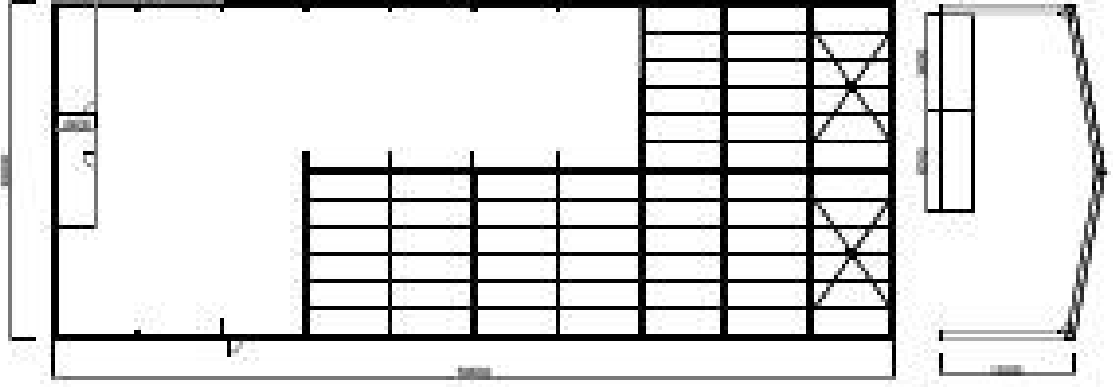
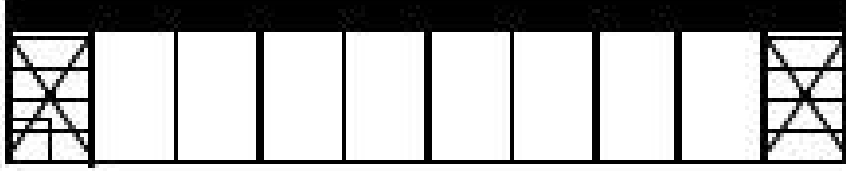
The plant is specially designed and constructed according to the requirements of tire pyrolysis.

-
- Reinforced concrete foundation, 2000 m2,
 - Steel construction , without side walls to keep better ventilation inside
 - Outside storage area 5.000 m2, for tires and final products,
 - General Office facilities for personnel use, administration offices and laboratories,
 - DIMENSIONS: Length: 60m Width: 33 m Height: 9m TOTAL AREA: 2.000 m2
-



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• Auto-feeder:

- 1. 60tons hydraulic pressure.
- 2. With auto-feeder you can feed more raw material and save time.
- 3. There is a winding engine in the lower Auto-feeder, it is used to draw the steel wire out from the reactor.





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COMMERCIAL OFFER (REMARK: PRICES WILL BE GIVEN UPON SIGNIUNG THE NDA.)

A) EQUIPMENT AND TECHNICAL COMPONENTS

No	Name	Model	Unit	Qty	Unit Price (USD)	Amount (USD)
1	15TPD fully continuous Waste tires Pyrolysis system Auto-feed Safe Indirect heating Carbon black discharge	Fully Automatic and continuous process (Pre-treatment manual)	Set	2		
2	Recommended Equipment Pre-treatment equipment Syn-gas cleaning Exhaust gas cleaning Installation materials Pre-treatment equipment	Suitable for the system	Unit	1-2		
	Total price (FOB Qingdao,China)	Both the basic and optional configuration				
3	OPTIONALS					
1	Carbon black milling and packaging			1-2		
2	Crude oil distillation system 10 t / day			1-2		
3	MISCELLANEOUS			1		
4	TRAINING			1		
TOTAL, USD						



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SALES CONDITIONS

Delivery Method	Ex-works
Validity of the Offer	30 days
Delivery Time (EX-WORKS)	120-150 days , shipment from the factory, upon an official order and advance payment
Payment Terms:	
Advance Payment	70 % , t/t
Remaining Amounts	Subject to LC 25 % before delivery after the factory tests , 5 % after installation and acceptance
Warranty:	1 year warranty as part of CE certification against manufacturing and material failures. The shredder cutters (consumable parts) has only 6 months under warranty Seals, for lids and bearings are also consumable items and

REMARKS:

- The above prices are in USD and FOB Qingdao or Lianyungang Port, China.
- Prices are valid as long as the current rate of exchange exists (1 USD = 6,16941 RMB)
- We can offer CIF prices, any port, by the time the supply contract is to be signed
- Installation and commissioning: will need 2-3 engineers for 30-40 working days. Daily cost for each engineer 100 USD, will be paid by the customer, as well as accommodation, food and round trip tickets.
- Guarantee of the equipments will be for 1 year



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B) LOGISTICS & WASTE TRANSPORT

No	ITEM	UNIT PRICE USD	QTY	TOTAL PRICE USD
1	TRUCK, IVECO 50C, 1.5-2.5 T WASTE TRANSPORT CAPACITY , CLIMATISED		2	
2	TRUCK, IVECO 70C, 3-4 TON WASTE TRANSPORT CAPACITY , CLIMATISED		2	
3	TIRE TRANSPORT COMPARTMENT FOR EACH ABOVE (CARRIER BRAND CLIMATISED,)		4	
4	TRANSPORT TRACTOR FOR GENERAL PURPOSE (Tümosan, 400, average capacity)		1	
5	OTHER APARATUS FOR TRUCKS LICENSING AND SECURITY		4 lot	
	TOTAL LOGISTICS			(can be procured locally but if needed, we can quote)

C) HYGIENE AND PERSONAL SAFETY, PLANT SAFETY & SECURITY ITEMS

No	ITEM	UNIT PRICE EURO	QTY	TOTAL PRICE USD
1.1	Protective goggle, 1 year	20	100	
1.2	Protective mask, 1 year	1	5,000	
1.3	Dress for personal, 1 year	50	60	
1.4	Booth for personal, 1 year	50	60	
1.5	First-Aid equipment, 1 package	20,000	1 set	
	TOTAL			



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D) HOUSING & CONSTRUCTION

NO	MODALITY	BUDGETARY COST, USD
1	CONSTRUCTION REINFORCED CONCRETE FOUNDATION SHED LIKE, LIGHT STEEL CONSTRUCTION, (4000 M2 TOTAL) , WITHOUT SIDE WALLS OFFICE: 100 M2 X 3 ROOMS: 4 LABORATORY	
2	LAND PREPARATION AND ENVIRONMENTAL ACRCHITECTURING	
3	MISCELLANEOUS SECURITY MEASURES FOR THE HOUSING	
4	FIRE PROTECTION EQUIPMENT AND APPARATUS FULL AUTOMATIC FIRE DISTINGUESHER SYSTEM	
5	POWER AND WATER SUPPLY AND WASTE WATER DISCHARGE AT THE PLANT	
6	FUEL TANK	
7	CLEAN WATER TANK	
	TOTAL	

REMARK: PRICES WILL BE GIVEN UPON SIGNIUNG THE NDA.

We hope the project is considered to be positive and receives your attention and order.

Yours sincerely



Dr. Cemal Kaldirimci,
Managing Director, Owner
Metan Green Health & Environmental Engineering & Consultancy Co., Ltd